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Numbers in the News

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www.StatLit.org/pdf/2008RaymondSchieldASA6up.pdf

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GAISE Guidelines

The ASA GAISE College report recommended:

- *"introductory courses in statistics should, ...strive to emphasize statistical literacy*
- assessing statistical literacy by students *"interpreting or critiquing articles in the news and graphs in media."*

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Statistical Literacy: Lack of Data

Statistics course design should model the use of real data.

"No comparative analysis has ... mapped out the ... statistical ... concepts and topics ... that adults may encounter..." Gal (2003)

If statistical literacy is to be empirically-based, the real- world use of numbers must be analyzed; the news media are a good place to start.

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Numbers in the News

Selected 899 news articles that used numbers to make inferences: generalize, predict or explain.

- 2007: 250 articles researcher analyzed, 93 traits.
- 2008: 160 articles researcher analyzed, 73 traits
- POOLED: weighted average for common traits.
- 2008: Machine-readable content of 899 articles computer-searched for prevalence of 231 terms.

Excluded numerical articles that didn't involve inferences: sports, weather & stock prices.

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Pooled Content of Articles SIMPLE DATA

Percentage of articles that have the following:

- 48%: Percents
- 33%: Numbers (counts or sums)
- 31%: Rates (c.f. unemployment rate)
- 6%: Ratios (e.g., miles per gallon)
- 4%: Mean/Average⁰⁷
- 2%: Ranks or percentiles

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Pooled Content of Articles COMPLEX DATA

Percentage of articles that have the following:

- 3%: Slope
- 1%: Range
- 1%: Effect size or elements thereof

For all 899 articles:

- 0%: Standard deviation, z-score
- 0%: Coefficient of Variation
- 0%: Relative risk
- 0%: Odds ratio or Gini coefficient

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**Pooled Content of Articles
COMPARISONS**

Percentage of articles that include:

- 65%: Quantitative comparisons⁰⁸
- 21%: Qualitative comparisons
- 4%: “Attributed[able] to”
- 4%: Cases attributed to

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**Pooled Content of Articles
RATIO GRAMMAR**

Percentage of articles by type of grammar:

- 45%: Percent of (X% of <whole> are <part>)
- 37%: Rates (e.g., birth rate, rate of births)
- 28%: Chance/risk/probability
- 10%: Ratios (e.g., miles per gallon)
- 3%: Percentage*

* The percentage of <whole> who are <part>
Among <whole>, the percentage of <part>

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**Pooled Content of Articles
Statistical Inference**

Percentage of articles that involve inference:

- 62%: Assert cause
- 59%: Use sample
- 53%: Give sample size
- 14%: Mention “significant” or “significantly”
- 2%: Mention random sample
- 1%: Give Margin of Error
- 1%: Mention “Statistically significant”

- 0%: Give a Confidence Interval
- 0%: Give p-value

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**Pooled Content of Articles:
DESIGN OF STUDY**

Percentage of articles that indicate study design:

- 26%: Controlled study (two or more groups)
- 22%: Observed several times (longitudinal)
- 15%: Cohort
- 11%: Subject manipulation (experimental drugs)
- 11%: Controlled by selection⁰⁸
- 9%: Factor controlled or taken into account
- 5%: Subject blinded (placebo)
- 4%: Plausible confounder indicated⁰⁷
- 2%: Random assignment

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**Content of Articles:
Troublesome Inference**

Plausible alternate explanations for numerical results based on researcher judgment:

- 45%: Assembly*
- 42%: Confounding⁰⁸
- 11%: Bias⁰⁸
- 9%: Chance or random effect⁰⁸

* Choice of definition, groups or measures

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Conclusion

**To help people analyze numbers in the news,
Statistical Literacy must focus on:**

- Sampling, sample size (60%)
- Association versus causation (60%)
- Assembly (45%)
- Rate, ratio (40%)
- Study design: longitudinal & manipulation (40%)
- Significant (14%) vs. statistically significant (1%)